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ABSTRACT

To determine whether learning words can be accomplished effectively using the computer, 11 first grade children in an experimental group were taught specific sight words on the Apple computer as compared to the teaching of those same words to 11 children in the classroom using flashcards. A total of 25 words was taught over a five-week period. The experimental group children were told the code word that would retrieve the specific list of words to learn. The computer then flashed a word, in color, for 10 seconds on the screen. Then the word disappeared and the child was expected to spell the word. The child was given two tries before the computer displayed the answer. The control sample was flashed the words each day using index cards. The word was hidden and the child was asked to spell the word on paper. This same procedure for both groups was repeated each day. Results indicated that the control group sample obtained a significantly higher score than those in the experimental group. (Materials used in the study are appended.) (HOD)

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The Computer's Effect on the Learning of New Words

by

Dell Sudia

Presented in Partial Fulfillment
of the Requirements for the Master of Arts Degree

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ABSTRACT

This study involved a class of twenty-two first grade children, nine boys and thirteen girls. It was hypothesized that there would be no significant improvement when teaching first grade children specific sight words on the Apple Computer as compared to teaching those same words in the classroom using flashcards. A total of twenty-five words were taught over a five week period.

An analysis of the results indicated that the Control Sample, which were taught words via flashcards, obtained a significantly higher score than those in the Experimental Sample who were exposed to the same words on the Apple Computer.

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The computer plays such an important role in our schools today that research into its effectiveness is very necessary. Steiner (1983) stated that "According to a survey by the National Center for Educational Statistics, about half of the U.S. School districts owned one or more computers early in 1981." (pg.293) Also, Steiner (1983) found that many children had computers at home too.

Kastler and Roser's (1982) research has concluded that computers serve an important role in reinforcing the learning of reading, but they do not replace human interaction. Real reading involves readers, books, curiosity, questions, conversation, guidance, and opportunities to respond in different ways.

The uses of computers in the classroom are many. Steiner (1983) lists a few examples; the computer can give information on a specific topic, it can see if a child comprehends what has been taught, and it can provide experience in analytical thinking and problem-solving. Steiner's (1983) research also suggests computers can aid in diagnosis and help teachers see what needs to be taught again, direct children to software which is appropriate for them, decide when it is time to change to a different kind of activity, and can help a teacher to decide what the children should study next.

The three major type software available in schools are

drill and practice, for improvement of skills already learned; tutorial, information with questions following about content; and simulation, describes an event and asks students to take a role and choose how the action should proceed.

One research report done by Chevrette and Rupley (1983) favoring the benefit of computer use was the Stanford CAI, Computer Assisted Reading, program in initial reading. The study matched twenty-five pairs of girls and twenty-five pairs of boys chosen on the basis of the Metropolitan Reading Test. The Experimental group received eight to ten minutes of CAI for five months, the rest of the school day was the same for all children. Three post-tests were given to the children receiving CAI in reading and the same tests were given to the children receiving regular reading instruction. The post-tests were: four sub-tests of the Stanford Achievement Test, the California Cooperative Primary Reading Test (COOP), and a test specifically geared to the goals of the CAI reading curriculum. Of the six comparisons, only one, the COOP for the matched girls did not show a significant difference in favor of the children receiving CAL,

Another study favoring the benefits of computer use in the classroom, was the results of the Computer Curriculum Corporation reading curriculum for grades four

to six, reported by Chevrette and Rupley (1983). In the research it was found that students could cover twice as many new words and learn them faster than students using traditional basal readers only.

Research done by Malone (1983) shows that computer programs are more beneficial if not made too easy for the child nor too hard. For example, in a program if the child has reached a particular goal, he can be challenged further by trying to do it faster or better next time. These features are especially useful in drill and practice where the purpose is to improve previously learned skills. Also, skills can be taught where the correct answer progresses the player toward or away from a specific goal. In a baseball game, the child must keep getting correct answers to get a home run, but in a hangman game, the child must get the correct answers to keep from losing.

Chevrette and Rupley's (1983) research indicates the use of computers to help with reading is beneficial for many reasons. A computer can give individualized instruction with instant feedback, a student is enthused because of success, and a student is actively involved in the learning for the length of the lesson.

Finally, another view criticizing the role of the computer in the classroom is stated by Gollan (1984). Mr. Gollan feels the computer is a stimulus-response machine

similar to the "teaching machine" developed for schools after World War II by B.F. Skinner who is noted for his behavior modification research. He feels computers don't allow a child to reason, but slows down the reasoning process.

The experiment being presented will attempt to determine whether learning words can be done effectively using the computer. The premise of the experiment is not that the computer will do the teaching alone, but that the teacher will program the words into the computer and the computer's capabilities will produce games which will teach the children sight words faster and more effectively.

HYPOTHESIS

For purposes of this study it is hypothesized that there would be no significant improvement when teaching first grade children specific sight words on the Apple Computer as compared to teaching those same words in the classroom.

DEFINITIONS

An explaination of sight words is those words whose retrieval is immediate because extended language analysis skills are no longer required.

ASSUMPTIONS

Two assumptions were made. The test scores used to group the children were valid evaluations of the children's

reading levels and the number of hours spent using the computer and classroom time and the type of material used were sufficient to develop achievement differences.

LIMITATIONS

Some limitations of the experiment are that the study was limited to twenty-two first graders, that the group not using the computer could feel slighted and not perform as well, and that the group using the computer might feel threatened by it thus, a negative Hawthorne affect might be observed.

PROCEDURES

A first grade class consisting of twenty-two children, nine boys and thirteen girls, was used to meet the purposes of this study.

The parents of the children were sent a letter explaining the experiment and asking for their cooperation. Also, the Elementary Supervisor and Superintendent of Schools were notified of the experiment along with the Principal and the Vice-Principal of the school, which is located in Carteret, New Jersey.

The experiment began by choosing words from the Slosson Oral Reading Test and the Dolch Basic Sight Word Test to construct a teacher-made pre-test in which the children were asked to circle the word said to them. Each row on the test contained other words which looked very

similar to the word they were asked to locate. The children were given a total of fifty words to circle in this pre-test from which twenty-five were chosen to be taught. The words selected were those which the majority of the class failed to correctly select. It was decided that five words would be taught a week and the experiment would last for five weeks. By the end of the experiment, the children were exposed to twenty-five words.

The class was broken up into two groups with eleven children in each. The grouping was decided by using the total reading scores the children received on the C.T.B.S. (Comprehensive Tests of Basic Skills) in Kindergarten. Each group consisted of bottom, middle, and upper reading ability students as indicated by the test score results.

Each day the whole class was shown the five words for that week on separate index cards and the teacher recited the words. The words were then put away. The children in the Experimental Sample worked individually on the Apple II computer throughout each day. Prior to the start of the experiment, the teacher used existing educational software by creating and entering five word files, as required by the program to develop a teaching medium via the computer. The software used was made by the Minnesota Educational Computing Consortium and entitled Elementary Volume 2, Language Arts, Spell. When the experiment began, the

children were told the code word which would retrieve the specific list of words to learn. The computer flashed a word, in color, for ten seconds on the screen. Then the word disappeared and the child was expected to spell the word. The child was given two tries before the computer displayed the answer.

The Control Sample were flashed the words each day for ten seconds using index cards. The word was hidden and the child was asked to spell the word on paper. This same procedure for both Control Sample and Experimental Sample was repeated each day.

At the end of the experiment the pre-test was administered as the post-test and the results tabulated.

The children in the Control Sample were given time to utilize the computer throughout the week for other purposes so that they would not feel set apart from the Experimental Sample. For this purpose such educational software as addition and subtraction games, fill-in the missing alphabet letters, and others was used, but the students were not given access to the specific software utilized by the Experimental Sample.

RESULTS

In Table I the Mean, Standard Deviation, and t of the pre-test scores of the Control and Experimental Samples are compared. According to the results shown, there is no

Table I

Mean, Standard Deviation, and t of the Pre-test Scores of the Control and Experimental Samples

	Mean	Standard Deviation	t	sig
Experimental Sample	15.45*	4.80	1.7.	N.S.
Control Sample	14.72*	4.64		

Number wrong out of 25

significant difference between the Mean of 15.45 of the Experimental Sample when compared to the Control Sample's Mean of 14.72. It can be seen that there is a difference of only .73 between the means of the samples. Percentage right scores could be computed as 38.2% for the Experimental Sample and 41.2% for the Control Sample at the onset of the study.

In Table II the Mean, Standard Deviation, and t of

the post-test scores of the Control and Experimental Samples are shown.

Table II

Mean, Standard Deviation, and t of the Post-test Scores of the Control and Experimental Samples

	Mean	Standard Deviation	t
Experimental Sample	6.45	5.66	6.18
Control Sample	3.81	2.44	

Table II indicates there was a significant difference between the Experimental Sample Mean score of 6.45 and the Mean score of 3.81 of the Control Sample in favor of the Control Sample. Table II also indicates a substantial reduction in the Mean number wrong and this difference appears to be significant. It can be seen that the Experimental Sample's final test scores indicates a correct score of 74.2%, while the Control Sample's correct percentage would be 84.8%. If we were to subtract the 3 point difference between the samples at the onset, it would still be

seen that the Control Sample achieved a higher correct score after the period of instruction. A t of the Mean Reduction in the number wrong achieved by the Experimental and Control Samples was computed to determine whether the appearance of significance could be substantiated. The resultant t of 6.18 was found to be significant below the .01 level.

Table III

Mean, Standard Deviation, and t of the Mean Error Reduction of the Experimental and Control Samples

	Mean	Standard Deviation	t
Experimental Sample	9.00	4.669	
			4.477
Control Sample	10.9	3.618	

Table III shows the Experimental Sample's Mean Reduction in Error of 9 was significantly different than the Control Sample's Reduction in Error of 10.9. (Significance less than .01)

CONCLUSIONS

The results indicated that the Control Sample which were taught words through a conventional classroom method, via flashcards, obtained a significantly higher score than those in the Experimental Sample who were exposed to the same words on the Apple Computer.

It should be noted that the study was done for a five week period with a group of twenty-two children, therefore, one is not certain that a longer period of time and a different sample would yield the same results.

The study should not discount the use of the computer as a teaching tool however, the results suggest that more extensive research is desirable to determine the values of computer assisted instruction.

COMPUTER ASSISTED INSTRUCTION: RELATED LITERATURE

The type of software a teacher picks to teach reading is very important. Simulation software which is designed for use in the content areas can be very useful for reading instruction. According to Bork (1981) "a simulation is a model of a world real or imaginary." The key component of the simulation is called a variable. The Lemonade Stand is one of the most popular software programs used in the Elementary Grades. In it the student operates a lemonade stand. Balajthy (1984) explains the child must decide how much to spend on advertising, how many glasses to make at the beginning of the day and how much to charge per glass. Much thinking and reasoning is involved similar to the processes needed to read and comprehend.

The reasons simulation software are valuable for the teaching of reading are many. In Balajthy's (1984) research overview, Stefensen, Joag-Dev, and Anderson reported in 1979 that reading involves an interaction between the printed page and the reader's background knowledge and that simulations are an inexpensive way to provide background experience. In order for a child to understand better what he is reading, a simulation can expose a child to information which will enhance and clarify understanding.

Balajthy also referred to Edward Thorndike's (1917) opinion that there is a close relationship between reading

and thinking. The key to simulation learning, he suggests, is analytical problem-solving, based on instructions and output which must be read and understood.

Another important advantage of using simulation activities for reading is that much reading is required since directions are extensive. Children find if directions are not read carefully, subjects as in the Hammurabi game could starve to death.

Simulations seem to fit into the classroom well according to Balajthy (1984). They don't demand too much time from the teacher and important concepts are conveyed with little classroom disruption.

Finally, simulations do motivate a child to use their knowledge and decision-making abilities.

Balajthy (1984) feels a group approach to using the computer is beneficial using the simulation software. Group discussion and thinking are important to learning. In such an approach, students are encouraged to read the directions themselves rather than have the teacher read them first to the group. The teacher is encouraged to introduce and explain technical terminology before expecting a group of students to work on the computer alone. In addition, after the computer work is done, higher level thinking is encouraged. For example, emphasis is placed on the cause and effect of the game just played. Furthermore,

students are encouraged to speculate, after a game is played, what might have happened if a different strategy had been taken by the group. Many reading related activities are involved when using simulation software.

O'Donnell (1982) feels that since computer's methods and materials are becoming more effective and useful, the role of the teacher could gradually shift. The teacher could have more time for guiding individual children's progress, while the computer could provide the drills the child needs and also do record-keeping for the teacher.

O'Donnell (1982) cites research done by Grimes (ED 161 433), in which he states that drill and practice done on computers in Elementary reading and mathematics showed good results.

In a pilot project using CAI, Computer Assisted Instruction, students at Bath Elementary School in Ohio gained an average of 2.4 months in reading proficiency during the months they used the computer according to O'Donnell (1982). Most of the children became faster and more careful readers, possibly because the computer prints like a typewriter, thus the video terminal trained slow readers to read faster. There were one hundred sixth grade students involved in the study and they used the computer for remediation or enrichment. The teacher chose the best program for each child and he or she worked on it for

twenty minutes each day until the particular program was completed. After school hours, the computers were also available four nights a week for parents and students to work on. "According to the sixth grade teacher, the terminals best asset was the immediate feedback that prevented the students from practicing a mistaken method of operation..."

According to James von Feldt (ED 160 044), as reported by O'Donnell (1982), CAI seems to have a positive effect on children's achievement. Computer programs interest children of all ages and the information gotten from the computer, after a child has worked on a program, can be direction as to which program to work on next to increase learning.

All CAI programs have certain things in common and the goal is for the student to learn. According to Chevrette and Rupley (1983), "individual programs are designed to maximize student learning through choosing appropriate paths to desired tasks and utilizing small sequential steps with immediate feedback." Some programs are designed to have short steps that repeat themselves if the child seems to be having difficulty or the program is capable to switch to longer faster steps if the child understands the information quickly. Most programs require material at each level to be mastered before going on to a new level. There

is little chance that a child will spend a great deal of time on the computer doing the task incorrectly over and over again since the computer rewards the child on the screen with stars, pluses, and audio responses with each correct answer.

Chevrette and Rupley (1983) feel "the quality of the time spent in learning is high and the achievement perceived by the student is usually rewarding to him or her."

Also, they feel there are several reasons why CAI reading programs show students with higher achievement in reading than those using only the traditional basal readers in the classroom. One reason is that CAI programs are designed to give individualized instruction with instant feedback. Students are motivated through success and thus have more positive feeling developed towards reading. Thirdly, working at a computer terminal, a child is more actively involved in his or her learning for the entire time there in contrast with seatwork, where total involvement is not always present.

Chevrette and Rupley (1983) emphasize the importance of a child's "active engagement" in learning. By this is meant the actual student involvement in and attention given to a learning task. They feel without engagement, no matter how much time a teacher spends on presenting a reading

lesson, it will be ineffective without the child becoming actively involved in the learning. In Chevrette and Rupley's (1983) research they cite Marliave (1978), who in his analysis of the Beginning Teacher Evaluation Study, reported that engagement rate was positively associated with achievement outcomes. Also, in the same research Brophy (1979) "stressed that students' reading achievement can be enhanced considerably by increasing the time they spent attending to learning tasks."

Chevrette and Rupley (1983) have found that "keeping students engaged in meaningful reading tasks" is a teacher's "major instructional concern." The computer holds great promise in alleviating this potential problem. Using the computer, teachers can vary the pace of instruction, review and reinforce learning, enhance motivation, and provide immediate feedback. These factors increase the chances that students' engagement in reading instruction will be increased.

According to Wexler (1979), "computers will not make geniuses out of students, but can take much drudgery out of the learning process. "A recent Educational Testing Service study found most students seem to achieve about the same whether using a computer in the classroom or taught the same lessons without it. Where the computer's effect is felt though is with the poor student. Two reasons might

have to do with the computers ability to repeat over and over again patiently the same information and lack of embarrassment for the slow learner when he or she does not know the answer. In Los Angeles it was found computerized remedial drills developed for disadvantaged elementary children resulted in gains of thirty percentage points.

Another use of the computer as researched by Steiner (1983), is for children to learn to program utilizing a computer language such as BASIC, PASCAL, or LOGO. Presently, BASIC is most commonly taught although, PASCAL is used in some classes. LOGO is not a new language, but has recently begun to be more widely used. LOGO was developed by Seymour Papert at MIT and allows children to move shapes called sprites around on the computer screen depending on the child's commands. Using LOGO children can create designs on the computer screen. The importance of programming for children is giving them "access to concepts that children would not usually be expected to understand and appears to contribute to the children's cognitive development," as explained by Steiner (1983).

According to Weyer (1983), early reports of children using programming languages at Stanford University, Lawrence Hall of Science in Berkeley, and MIT suggest students can work together to write programs and solve problems. The Bank Street College of Education in New York

is conducting two studies (Sheingold, Jewson, Gearhart, and Berger) as explained in Weyer's (1983) research of elementary students using the LOGO programming language on microcomputers in two classrooms. The preliminary results of the first study indicate children are more apt to co-operate and work together when using the computer than when doing regular classroom work. In the second study it was found children would rely on certain of their peers for help using the computer, but not rely on them as frequently when doing other classroom tasks.

It has been observed by James Levin (1981) at the University of San Diego, as seen in the Weyer (1983) study that students prefer to work together on computers rather than alone as seen when students in a "computer club" were gathered around a few computer terminals leaving other computers unoccupied.

Sharing of ideas, results, and processes is illustrated by Dugdale (1982) in Weyer's (1983) research. "Students tried to connect a series of "green globs" scattered on a coordinate grid by specifying an equation." Strategies gotten by these students could be saved so others trying to solve the problem could look at previous accomplishments. This sharing, provides a sense of satisfaction for the students who have done the work, and helps others to figure out the problem. Answers cannot be copied,

since each time the game is played the "green globs" are distributed in a different manner, but understanding the equation that someone else used means students can change or modify it for their own use.

Seymour Papert of the MIT Division for Study and Research in Education said in Frann's (1979) article that a child controls a computer just as he controls a pencil, but a pencil limits a child. For example, when he is learning to write a composition, a child becomes frustrated writing a story using a pencil. The student must move sentences, change paragraphs, correct mistakes, edit words, etc., but with a computer it is much easier to do these tasks quickly and easily with less frustration. "Learning proceeds more smoothly, since the child is not so likely to become frustrated." Also, Dr. Papert feels, as reported in Frann's (1979) research, not only can writing be done on the computer, but a child can program the computer to draw, make music, help in science and history projects, and play games. "The child learns by doing," says Dr. Papert.

Soon, very young children, who are not able to read as yet, will be able to communicate with a computer through speech rather than using the keyboard, according to reports on advanced developments in computers. Even now young children can listen to taped instructions and interact with the computer by following instructions.

Other uses for the computer are to diagnose reading problems. The Education Center of Achievement Inc. in Tampa, Florida found the computer useful to diagnose as reported by Baines (1982) in Mason's (1983) research. "Interaction with the computer quickly makes apparent students' inattention to visual details such as sequence or shape" Mason (1983) stated. Children displaying these problems will probably have difficulty with spelling and word recognition. Luckily, working on a computer seems to greatly improve a students' visual attentiveness.

According to Mason (1983), a computer program that writes prescriptions, was developed by the Buckingham (Virginia) County Schools. The program known as CADPP, Computer Assisted Diagnostic Prescriptive Program in Reading and Mathematics, prints a prescription for each student after test scores are put in by the child's teacher.

Usually, children who are used to getting low scores on tests feel hostility toward the person administering the test to them. The computer is an asset in this situation. As shown in an educational clinic in Rockville, Maryland, many tests are programmed into the microcomputer. As the examiner asks questions and the child answers, the responses are typed on the computer keyboard. The child may ask, "How is my answer?" and the examiner may reply

"Well it sounds good to me. Let's see what the computer says." In this manner hostility toward the examiner is lessened and a rapport is more easily developed with the student, since the computer is doing the criticism and not the examiner. According to Mason (1983), test validity improved in this manner.

Another important use of the computer is as a tutor. Quite a few computer programs require a child to be a computer's tutor. According to Ahl (1978) as explained in Mason's (1983) research, one such program is called "Animal." "The player thinks up one animal after another, responding to questions which help the computer to guess the animal the student has in mind." If the computer has difficulty guessing the animal it asks the child to ask questions to give it further clues. As the game continues, the number of animals used goes up and the computer's chances of guessing correctly increases also. Sometimes a child may enter into the computer as many as fifty animals, thus the student must read and respond to fifty questions each time a new animal is added. This game is similar to a language experience approach to reading because the questions the child responds to are those written by the child, this according to Dworkin and Dworkin (1980) as reported in Mason's (1983) research.

The computer may also be used for conversation as in

a program called "Eliza." It encourages a child to read and write in a nonthreatening manner. The computer starts by asking the child, "What is your problem?" The child must type in a response and press the "return" or "enter" key. The conversation goes back and forth between computer and student encouraging the chid to work hours at productive reading and writing.

Other conversations are "Hello" Ahl (1979), and "Father" Ahl (1979), all reported in Mason's (1983) research.

Mason (1983) comments not all children enjoy these programs and caution should be taken before making all students work on them.

Another use for the computer is to help poor readers see small differences between words. Often, for example, they see on for no confusing letter order. Some read house for horse do to the fact that they don't notice which letters make up a particular word. A copying program, as explained by Mason (1983), helps with these problems. After typing in a listed program a student wants to run it, if mistakes are made this is where problems surface. The program will not run unless words are spelled exactly. The child must go back and carefully proofread and recopy mistakes so the program will work. Teachers report great improvement in spelling and better accuracy in reading

after students use this program. Also, children feel much satisfaction when they find their mistakes and the program will finally run.

Other accuracy training involve games which show a word briefly then the word disappears and the student must type the word they saw. Games such as these are available as disks or cassette tapes for microcomputers. "Speak"N"Spell" (Texas Instruments), "Talking-Learning Computer" (Tiger Electronics), and "Alphamaster" (Centurion) are some other microprocessor-driven devices available.

The computer can be used as a game partner, but the child can decide strategies. The strategies are signalled to the computer by the child. The computer then displays printed descriptions of the action rather than graphics. As explained by Mason (1983), "children playing these games repeatedly read, comprehend, and type instructions for action based on their reading." Teachers can reward children doing well in these games by allowing them to do more, thus students acquire skills in an enjoyable manner.

According to research done by Salganik (1979), a computer called PLATO (Programmed Logic for Automatic Teaching Operations) has been very successful in teaching basic skills to functionally illiterate adults. PLATO does one-to-one tutoring one student to one computer terminal

in reading, math, and language skills. Each student works two hours at a time on PLATO. PLATO breaks the learning into small steps and provides immediate feedback similar to B.F.Skinner's programmed instruction. It is all done with animation and game-like learning exercises.

With the PLATO basic skills program, a student beginning in math can add and subtract by moving fish from one bowl to another with the touch of a finger. PLATO begins each new unit with a short diagnostic inventory. It teaches by giving brief explanations followed by practice examples. A student who doesn't understand can press a button on the keyboard marked "Help" and will be given additional explanation. PLATO knows which students have mastered which skills and remembers where they have left off when it is time to begin again.

According to Salganik (1979), "preliminary evaluation" showed "students who completed the program gained a grade level in reading for every thirty-two hours of study time, compared to the one hundred and fifty hours of traditional classroom instruction which would be expected to produce such gain."

The PLATO basic skills program is also being tried in inner-city schools, prisons, and on an army base.

Research done by Molnar (1978) indicates the curriculum in schools today does not introduce problem-solving

skills early enough. By the time they are introduced children either are not interested any more or are so dependent on others for guidance they cannot master these skills. Computers provide a new way of thinking and should be used as early as possible. Computers eliminate many of the manual skills, thus allowing children to deal with problems of complexity. Since, many schools use computers today all students must become computer literate and this education must come from teachers, Molnar (1978) feels "a national effort is needed to introduce computing into the educational curricula and into our nation's textbooks." In the United States responsibility for education is shared at the local, state, and federal levels and these three areas must work together on the need for computer literacy. Other nations are working toward educating their people with the computer. If the United States doesn't follow "the next great crisis in American education will be the computer literacy crisis," this according to Molnar's (1978) research.

Deciding on which computer teaches reading best is not an easy question to answer according to Mason (1983). One area to consider when choosing a computer for a classroom is cost. The difference in price on the various computers is due to the various tasks it can perform. The more capabilities, the higher the cost will be. One type of

computer is programmed to do a few standard routines with word lists or sets of letters stored in read-only-memory (ROM) or in plug-in cartridges. Some of this type are Speak-N-Spell, Speak-N-Read, Alphamaster, Electronic Teaching Machine, and more. The second type computer is the networked computers in which one computer has a disk drive and printer and serves as the "host" which loads programs into the other computers (which serve as terminals).

Whether to have a computer with color capability or not is something to consider. On the positive side color draws the attention of young children, but on the negative side on some computer screens the color bleeds around the edges of the printed letters making them fuzzy and hard to read. Some reading specialists and primary teachers prefer a no color computer. Another consideration is the ease of use. The most important feature for most reading teachers is the software that is available for the computer chosen. At present the majority of software for the teaching of reading is available for the following computers; the TRS-80 Model I and III, the Apple II, II plus, and IIe (and its emulator, the Franklin Ace), the TI-99/4A, the Commodore PET, VIC, and 64, and the Atari 400 and 800. The large amount of software available for these machines results from their presence in schools. Mason (1983) also adds that software is not necessary to teach reading; some teachers

have taught remedial reading effectively by teaching their pupils to program.

As discussed by Weyer (1983), some people think computers are fads which will lose their popularity, but "good educational systems will be layered in such a way that as one level is mastered, the student will begin to discover the next level of complexity."

As can be seen, the uses of computers in education are varied and constantly growing and appear to be educationally valid in a number of areas. Much more research needs to be done, however, to determine specific utility.

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APPENDICES

Raw Scores Control Sample

Number Wrong Out of Twenty-Five Words

Pre-test	Post-test
13	5
6	1
16	6
9	0
19	5
11	3
20	2
18	8
13	2
19	6
18	4

Raw Scores Experimental Sample

Number Wrong Out of Twenty-Five Words

Pre-test	Post-test
20	8
21	5
17	17
13	6
18	14
6	0
9	0
18	8
17	2
19	10
12	1

The words circled are those 25 which were taught.

pg 1.

Name _____

1. fat far fast fall

2. cold cone (could) comb

3. best bell buy been

4. him hurt her help

5. has here heat hole

6. star stolen stick start

7. out our own owl

8. under uncle upon until

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9. use ugly us uncover

10. went want wash what

11. smell smile (small) smoke

12. worry waste would wish

13. wring (well) wall west

14. rid rode ring ran

15. saw sat same sad

16. says seem (said) sorry

17. them those that there

18. wash want wasn't well

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19. warm warn were wear

20. bald bag (basket) bang

21. fold field frost fast

22. fun fall (farmer) frog

23. (hope) hop hang hall

24. funny fry forest flute

25. stare (stars) stamp style

26. stone stick (station) store

27. sang (safe) soft smog

28. smile sing smash shut

29. out ocean outside open

30 doll dad damp darn

31. dusty (destroy) dummy desert

32. hammer husband hunger hum

33. exit excite excuse ego

34. understand underneath (understood) uncle

35. prize pride (price) prom

36. flame flakes flaps thanks

37. silly slice (silence) slide

38. sign sleep serious cereal

39. coming court (courage) cough

40. distance dancer (distant) distaste

41. angle anger amber anywhere

42. further funny (future) flute

43. claim (claimed) clam clapped

44. tear taller (tailor) taste

45. temple (terrace) terror test

46. juggle jumbo (jungle) jump

47. manage (marriage) match math

48. forward (forhead) forman forrest

49. even everything (evening) easy

50 eight elf (empty) mighty

January 2, 1985

Dear Parents,

I am presently completing graduate work towards my Masters degree. My thesis work will involve your children in an experiment. I will be dividing the class into two groups. One group will be learning words on the Apple computer and one group will be given the same words to work on in the classroom.

The purpose of the experiment is to determine if using a computer improves the learning process and makes it more effective.

The experiment will go on for five weeks. In that time, your child will spend ten minutes each day working on the five words I will present to them.

If you have any questions, please contact me.

Thank you for your cooperation.

Sincerely,

Mrs. D. Sudia

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January 2, 1985

Mr. Gerald Brown
Elementary Supervisor
Carteret High School
Carteret, N.J. 07008

Dear Mr. Brown,

I am presently completing graduate work towards my Masters degree. My thesis work will involve my class in an experiment. I will be dividing the class into two groups. One group will be learning words on the Apple computer and one group will be given the same words to work on in the classroom.

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